

July 31, 1934.

W. M. PRATT

1,968,096

ROOF TRUSS

Filed April 4, 1930

4 Sheets-Sheet 1

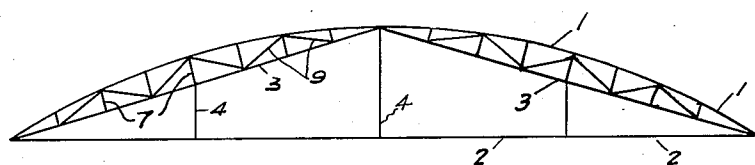


FIG 1

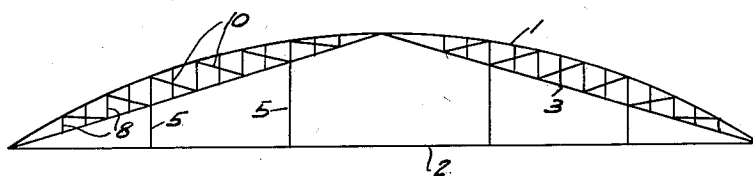


FIG 2

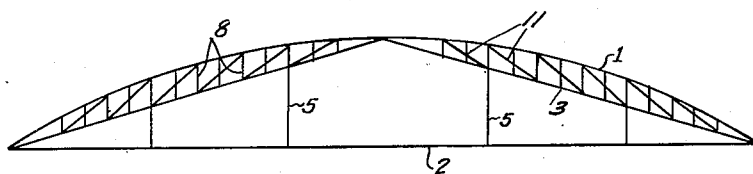


FIG 3

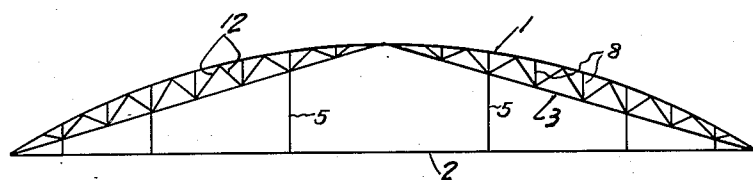


FIG 4

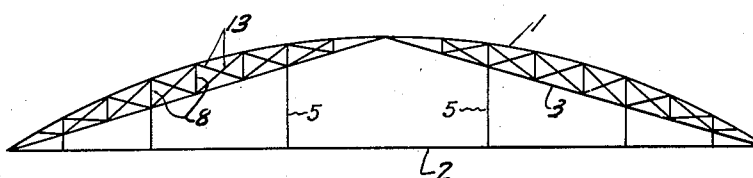


FIG 5

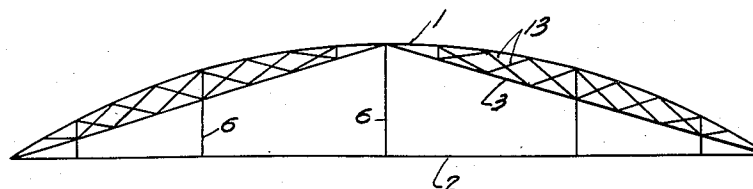


FIG 6

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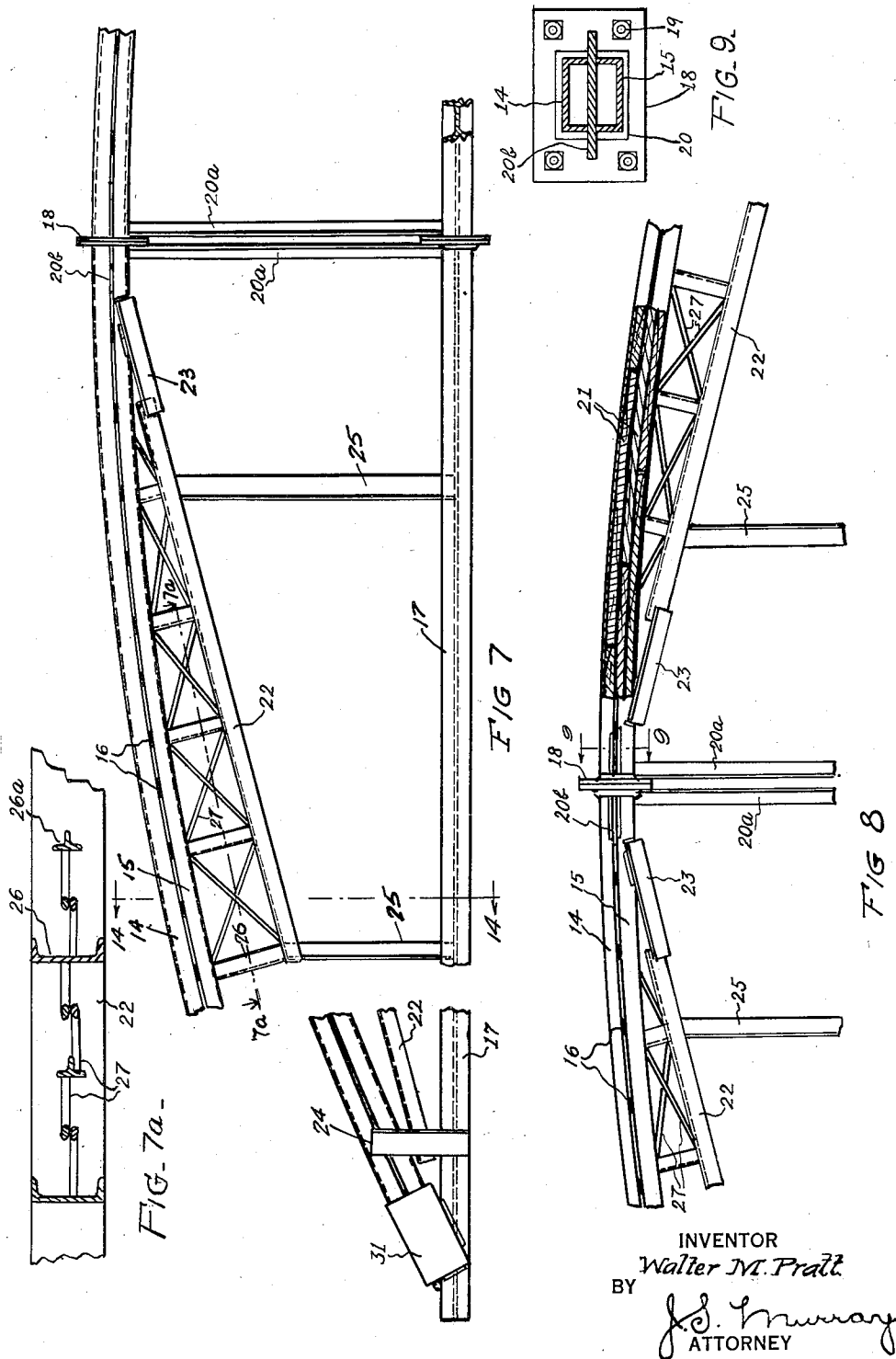
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4 Sheets-Sheet 3

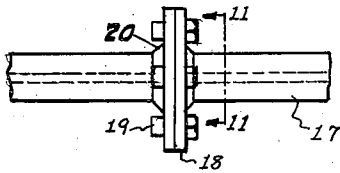


FIG 10

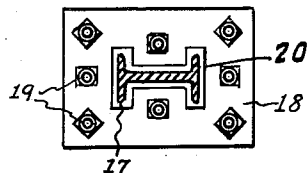


FIG 11

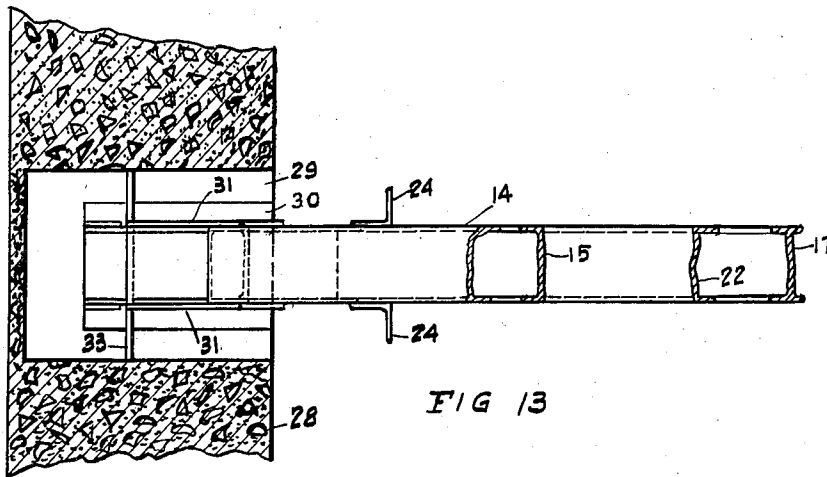


FIG 13

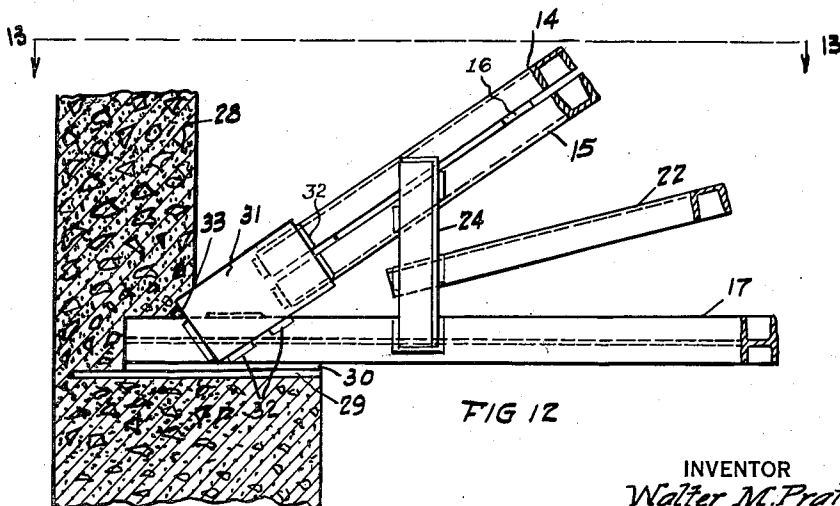


FIG 12

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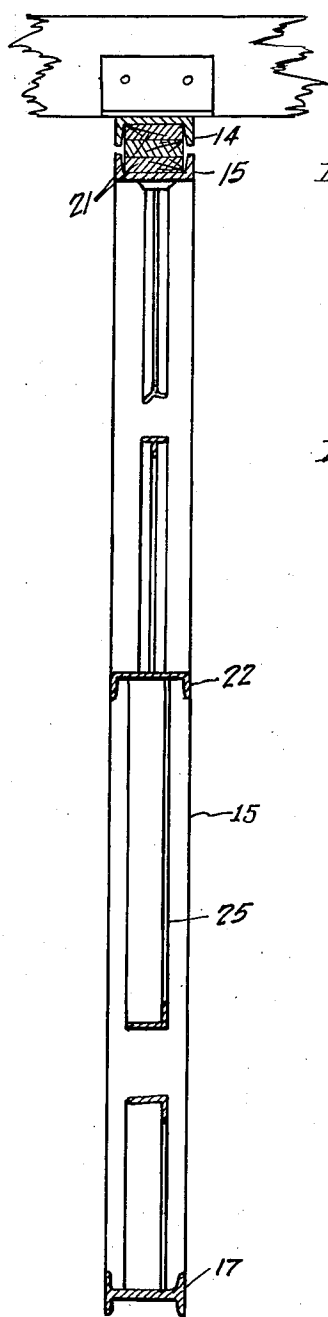


FIG 14

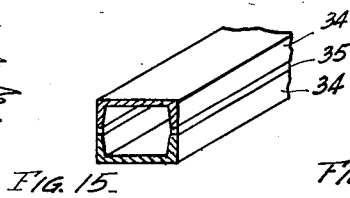


FIG. 15

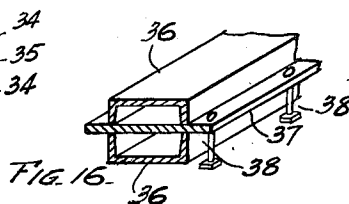


FIG. 16

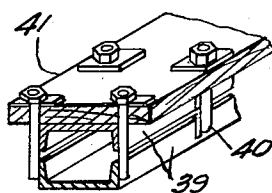


FIG. 17

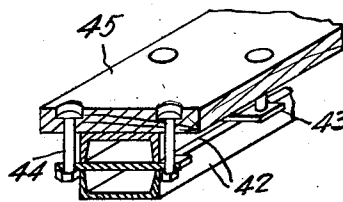


FIG. 18

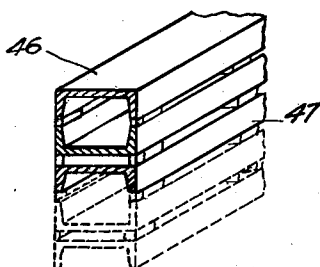


FIG. 19

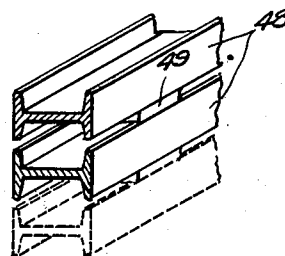


FIG. 20

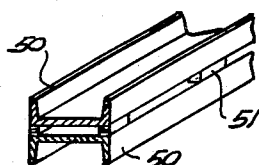


FIG. 21

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ROOF TRUSS

Walter M. Pratt, Detroit, Mich.

Application April 4, 1930, Serial No. 441,534

4 Claims. (Cl. 108—23)

This invention relates to building trusses such as are employed primarily in supporting roofs and bridge spans, and particularly relates to building trusses having arched top chords.

5 An object of the invention is to provide a truss comprising an arched top chord, a bottom chord, and brace members extending from the truss extremities to the central portion of the top chord, and to provide a system of bracing between said

10 brace members and top chord, giving the effect of two truss members meeting centrally of the truss and each comprising one-half of the top chord.

Another object is to form the arched top chord of a truss from a plurality of standard steel beams

15 individually bent to the proper curvature and subsequently assembled one below another and rigidly connected to form a unitary member.

A further object is to form such a chord from a pair of rigidly connected standard steel channels arranged flange to flange, one above another, and individually bent to a suitable curvature prior

20 to their connection.

Another object is to reinforce a hollow top chord, formed as above described of upper and

25 lower channel beams, by extending within said chord a reinforcing core, built-up preferably of wooden planks.

Still another object is to provide a truss comprising an arched top chord and a pair of main

30 brace members extending from the extremities of said chord to its center portion, and to connect said top chord and brace member by a system of bracing comprising substantial uprights, said top chord comprising a pair of upper and lower steel

35 beams welded together at points vertically registered with said uprights, whereby stresses are most efficiently transmitted through said uprights to said top chord.

A still further object is to provide improved

40 joints between abutting portions of the chords of a building truss, whereby sections of said truss may be built up in a shop or yard, so as to be readily rigidly connected when positioned for use.

These and various other objects the invention

45 attains by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Figs. 1 to 6 inclusive are diagrammatic, side

50 elevational views of various modifications of a truss embodying the same primary improvements.

Fig. 7 is a view in side elevation of substantially a half portion of an improved truss slightly further modified from the diagrammed constructions.

55 Fig. 7a is a cross sectional view of the truss

shown in Fig. 7, the section being taken upon the line 7a—7a of Fig. 7.

Fig. 8 is a fragmentary, side elevation of a central upper portion of the truss of Fig. 7.

Fig. 9 is a cross section taken upon the line 9—9 of Fig. 8, and disclosing the use of splice plates to rigidly connect abutting halves of the top

60 chord.

Fig. 10 is a fragmentary, side elevational view of a similar joint established between abutting

65 halves of the lower chord.

Fig. 11 is a cross section upon the line 11—11 of Fig. 10.

Fig. 12 is a fragmentary, elevational view of an end portion of the truss illustrated in Figs. 7—11,

70 sectionally showing a supporting wall.

Fig. 13 is a horizontal, sectional view of the same, taken upon the line 13—13 of Fig. 12.

Fig. 14 is a vertical, sectional view of said truss,

75 taken upon the line 14—14 of Fig. 7.

Fig. 15 is a fragmentary perspective of a top chord, modified slightly from the disclosure of Figs. 7, 8, and 14.

Fig. 16 is a similar view of a further modification.

80

Figs. 17 and 18 disclose still further modifications of a built-up top chord, illustrating a provision for attaching a wooden nailing plate.

Fig. 19 is a fragmentary perspective of a top chord built up of more than two interconnected

85 standard steel beams, arranged one above another.

Fig. 20 is a similar perspective showing a bottom chord correspondingly built up of standard steel beams.

Fig. 21 perspectively illustrates an alternative form of bottom chord built up of standard steel beams.

90

Those forms of the invention diagrammatically appearing in Figs. 1—6 inclusive all employ a parabolic top chord 1, a substantially straight bottom chord 2, and a pair of main brace members 3 extended to the center of the top chord from the intersections of its ends with those of the bottom chord. In Fig. 1, hangers 4 are extended to the bottom chord from the center of the top chord,

100 and from one or more intermediate points of each main brace member 3.

Figs. 2, 3, 4, and 5 correspond as to elimination of the central hanger shown in Fig. 1, the bottom chord being supported by a plurality of hangers 5 suitably spaced between the truss ends and center.

105

In Fig. 6, the top and bottom chords are connected by a plurality of hangers 6, one central of the truss, and the remainder suitably spaced between the truss ends and center.

110

In each of the constructions diagramed, a system of bracing rigidly connects the top chord 1 and main braces 3. Thus, in Fig. 1, a plurality of spaced brace members 7 perpendicular to the main braces 3, extend from the latter to the chord 1, and in Figs. 2 to 6 inclusive, spaced vertical brace members 8 similarly connect said chord and braces.

In Fig. 1, diagonal braces 9 are extended between the top chord and member 3 in each of the panels formed by the members 7, said diagonals alternately inclining in reverse directions.

In Fig. 2, the panels between the uprights 8 and individually occupied by diagonal brace members 10, inclined reversely upward from their inner to their outer ends, at opposite side of the truss center.

In that modification shown in Fig. 3, the uprights 8 are more numerous than in the other diagrams and diagonals 11 are provided in the panels formed between alternate uprights 8. Said diagonals as shown incline upwardly from their outer to their inner ends, their inclination thus differing at opposite sides of the truss center. Said diagonals are welded at their mid-portions to the uprights 8 which rise centrally of the panels occupied by said diagonals, and thus said diagonals and the uprights to which they are welded strongly reinforce each other.

As shown in Fig. 4, each panel between the uprights 8 is occupied by a pair of brace members 12 reversely inclined to intersect the top chord midway of such panel.

Figs. 5 and 6 illustrate provision of a pair of diagonally crossed brace members 13 in each of said panels.

The improved truss illustrated in Figs. 7 to 14 inclusive comprises an arched top chord (preferably parabolic) formed by paired upper and lower standard channel beams 14 and 15 having their flanges adjoined to form a hollow unit. A rigid connection is established between the adjoined flanges, preferably by welding. Thus, in said figures, welding beams 16 are formed at suitable space intervals.

It is important to observe that the hollow unit formed by said beams is of a cross section unsuited for bending, yet highly desirable from the standpoint of strength. The employment of such a cross section in an arched chord is made possible by building up said chord from the beams 14 and 15 which may be individually bent to the desired curvature.

The lower chord 17 of the truss shown in Figs. 7 to 14 consists of a standard I-beam having its web arranged transversely of the truss.

The upper and lower chords are each formed in halves abutting centrally of the truss, and adapted to be readily connected at the place of installation. Thus, a pair of splice plates 18, preferably rectangular, are rigidly mounted upon the meeting ends of the halves of each chord, transversely of the latter, and are adapted to be bolted to each other face to face as indicated at 19. To attach said plates to the chord beams, welds 20 are preferably established between said plates and beams entirely around the margins of the beam extremities.

The splice plates 18 of the top and bottom chords are connected to each other preferably by a pair of uprights 20a of T-shape in cross section, said uprights being welded to opposite faces of said splice plates and spaced apart by the latter, as best appears in Figs. 7 and 8. These uprights increase the rigidity of each half section

of the truss and tend to prevent such vibration of the central portion of either chord (and particularly the lower one), as might tend to loosen the bolts 19.

The described joint is further reinforced by interposing a pair of heavy sheet metal plates 20b between the beams 14 and 15, one at each side of said splice plates and welding same to said beams and plates. The lateral and vertical strength of the joint is increased by extending the splice plates some distance above, below and at each side of the top chord, and the plates 20b also preferably project laterally beyond the chord.

It is preferred to reinforce the top chord 14, 15 by inserting in the hollow thereof a core 21 consisting preferably of wooden planks arranged in superposed courses nailed or otherwise fastened to each other at suitable points and having their end joints longitudinally staggered as best appears in Fig. 8.

From the ends of the truss, a pair of main braces 22, preferably rectilinear, are extended to the center of the top chord. Said braces preferably consist of standard channel beams having their webs arranged transversely of the truss, their inner ends being fastened to the top chord, preferably by angle bars 23, which overlap and are welded to the lateral faces of said braces and the top chord, as best appears in Fig. 7.

The outer ends of the main braces are each welded or otherwise rigidly secured to a pair of upright angle bars 24, welded to the sides of the top and bottom chords, as best appears in Figs. 12 and 13. Thus said members 24 act to reinforce the joint between the top and bottom chord extremities, as well as anchoring for the outer ends of the main braces 22.

At suitable intervals between the truss center and its extremities, vertical hangers 25 are provided to support the lower chord and its load. These supports preferably have the form of angle bars, terminally welded to the members 17 and 22.

Between the top chord and each main brace 22 is provided a system of bracing, producing in effect two truss members extended from the ends of the main truss to the center of the top chord, each thereof embracing one-half of the top chord. Thus, a plurality of channel-shaped brace members 26, and of T-shaped brace members 26a are arranged in alternation at suitable intervals to connect each main brace to the top chord, being, as illustrated, perpendicular to the main braces. In each of the panels formed between the members 26 and 26a, a pair of diagonally crossed brace rods 27 are disposed, said rods and the members 26 and 26a being preferably welded to the top chord and main braces. The members 26 preferably have the full width of the truss, so that their sides are flush with those of the top and bottom chords.

The truss terminally engages suitable seats formed upon walls or columns 28, superposed sheet metal plates 29 and 30 being engaged between the truss extremities and said seats for distributing the truss load to an adequate seat area. The lower chord, which directly engages the plates 30 is slightly spaced below the ends of the top chord (as best appears in Fig. 12), and a pair of sheet metal plates 31 laterally overlap the adjoining ends of the two chords and are welded thereto, as indicated at 32. An anchorage pin 33 is extended transversely of the truss adjacent to the outer ends of the plates 31 and to the top edges of the

lower chord, and is welded to said ends and edges.

Various possible modifications of the top chord of the described truss are illustrated in Figs. 15 to 19 inclusive. Thus, in Fig. 15, there is shown a top chord comprising upper and lower standard channel beams 34 having edges adjoining as in the first-described chord, but disclosing continuous welds 35 between said flanges. This secures a somewhat greater strength than the first-disclosed construction, in which the welds are spaced.

The top chord shown in Fig. 16 also employs reversely disposed standard channel beams 36, a sheet metal plate 37 being in this construction interposed between and welded to the flanges of said beams. Said plate marginally projects at the sides of the chord, and its projecting portions are engaged by bolts 38 to support any desired suspended structure.

In Fig. 17, a pair of upper and lower reversely disposed channel beams 39 are welded to each other at intervals, and the same welds fasten vertical bolts 40 to the lateral faces of said beams, for attaching a nailing plate 41 to the top of the chord.

The top chord shown in Fig. 18 comprises upper and lower standard channels 42 having strips of heavy sheet metal 43 engaged at intervals therebetween and welded thereto, said strips projecting beyond the side faces of said beams for engagement by bolts 44 for securing a wooden nailing plate 45 upon the chord.

Fig. 19 illustrates the possibility of building up a top chord of more than two standard steel channels 46, the flanges thereof projecting alternately upwardly and downwardly, welds 47 being employed at suitable longitudinally spaced points to connect said beams.

In Fig. 20, the same structural feature is shown applied to a bottom chord formed by two or more superposed standard channel beams 48 welded to one another at suitable longitudinally spaced points, as indicated at 49. It is to be noted in connection with the chord forms illustrated by Figs. 19 and 20 that the welds between the beams are registered vertically.

Fig. 21 discloses a further modification for the lower chord of a metal truss comprising a pair of channel beams 50 extending one above the other with their webs adjoining and welded to each other at suitable space intervals, as indicated at 51.

In the described construction, the system of bracing between the top chord and main braces comprises relatively light and small members, and a maximum of space for light, ventilation, or other purposes is provided between the top and bottom chords.

The various types of top chords disclosed by this application are built up of members, capable of inexpensive bending in their vertical plane, by virtue of their relatively slight vertical stiffness.

Said members, however, have a very considerable lateral stiffness, and the unitary connection of a plurality of said members in superposed relation combines their several vertical stiffnesses so that the unit as a whole has great stiffness, both laterally and vertically. Where spaced welds are employed to connect the beams forming said top chord, they are formed at sufficiently close intervals to insure a vertical stiffness at least as great as that of the complete chord in a lateral direction.

What I claim is:

1. The combination with two aligned chord sections, each comprising upper and lower metal members, of a pair of splice plates rigidly engaging end faces of said sections and meeting in a plane substantially transverse to said sections, means rigidly connecting said plates to each other, and a plate arranged transversely of said splice plates between the upper and lower members of each of said sections, welded to said members and to the adjacent splice plate.
2. The combination with two sections of a truss chord, each comprising upper and lower members and arranged in end to end relation, of a pair of splice plates respectively permanently secured to the adjoined ends of said sections and abutting face to face, transversely of the chord, and marginally projecting at each side of the chord, a plurality of fastenings rigidly interconnecting said plates, and a pair of plates, each positioned between the upper and lower members forming one of said sections and projecting at opposite sides of said members, and endwise abutting against said splice plates, said reinforcing plates being welded to the splice plates and to the members between which they are positioned, and functioning to interconnect the upper and lower members, to assist in fastening the splice plates to the chord sections, and to reinforce the chord against transverse stresses.
3. The combination with a metallic chord member of a splice plate, occupying a substantially transverse relation to said member and engaging an end face of the member and projecting above, below and at each side of said member, said member being welded to said plate, around substantially the entire margin of the contact area of the member and plate.
4. The combination with two sections of a truss chord, arranged in end to end relation, of a pair of splice plates respectively permanently secured to the adjoined ends of said sections and abutting face to face, said plates projecting marginally above, below and at each side of said sections, and fastenings rigidly and detachably connecting the projecting marginal portions of said plates, said plates strongly reinforcing the chord in connecting the sections thereof.

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